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# **Diesel/Natural Gas (NG), as an Alternative Fuel for Towboat Operations**



## **Brazil and U.S. Compared**

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***Sponsored by:***

***American Commercial Lines International LLC***  
***A unit of American Commercial Lines Holdings LLC***

# Company Overview

- Largest and most diversified barging company in the U.S.
- Operates approximately 5,100 barges and 200 towboats on inland waterways in the Americas
- Transports more than 80 million tons of freight per year
  - 10.6 million tons of liquids

## Company Overview (Cont.)

- Revenues reached \$790 million in 2001
- Employs approximately 3,400 individuals
- Operates marine construction, boat & barge, ancillary service facilities and river terminals

# ACL is a fully-integrated inland marine transportation company

## ACBL

- Largest barge operator in North America
- 4,500 hopper barges; 450 tank barges; 200 towboats

## ACL INTERNATIONAL

- Leading barge operator in South America
- 445 barges, 25 towboats
- Significant growth opportunity

## ACL

## LDC

- Extensive dry docking and cleaning facilities
- 22 facilities

## ACT/GMS (50% ownership)

- Largest Bulk/Steel Terminal operator on U.S. System
- Offers a package of services
- 25 river terminal sites

## JEFFBOAT

- Largest inland shipyard
- Provides low fleet capital cost

# Marine Equipment

*Full Tow*



*Towboat*



*Covered Hopper Barge*



# ACBL Areas Served



- **Upper Mississippi**
- **Ohio River**
- **Illinois River**
- **Tennessee/Cumberland River**
- **Tenn Tom/Warrior River**
- **Lower Mississippi**
- **Gulf Intercoastal West**
- **Gulf Intercoastal East**

# Typical Tow Size

**Mississippi River : 30 + Barges**

## Characteristics:

Tug Boat: 8,400 HP

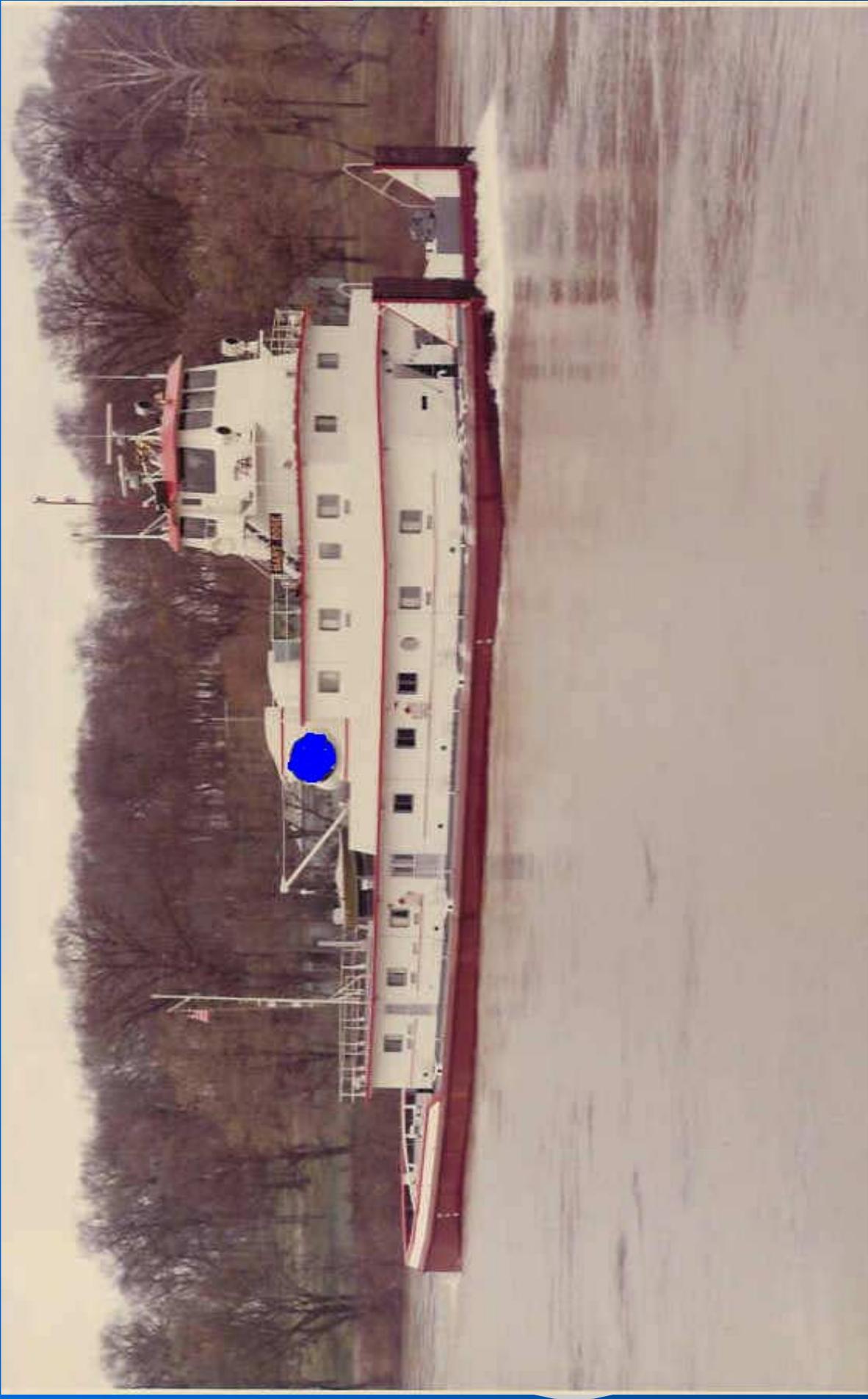
Crew Size: 9 crew

Tonnage: 45,000 Tons

Commodity: Grain



# Similar to Brazil Towboat



# Assumptions:

	<b>Brazil</b>	<b>U.S.</b>
Number of Vessels	2	1
Prime Mover Brake Horsepower/ Vessel	3600	6800
Full Power During Trip	90%	85%
Genset k Wh	105	150
Load Factor/Operating Day	80%	80%
Vessel Operating Days/ Year	350	355

# Fuel Cost:

	<b>Brazil</b>	<b>U.S.</b>
Diesel (\$/gallon)	\$1.30	\$0.82
LNG (liquefied natural gas):		
NG Acquisition Cost (\$/MMBtu)	\$0.76	\$2.52
Liquefaction Charge (\$/MMBtu)	\$0.00	\$1.00
LNG Allocation Cost (\$/MMBtu)	\$0.90	\$0.00
LNG Fuel Tax (\$/MMBtu)	\$0.00	\$1.43
<b>Total LNG Cost</b> (\$/MMBtu)	\$1.66	\$4.82
<b>Total LNG Cost</b> (\$/diesel gal equiv)	\$0.23	\$0.67

# Conversion Factors:

	<b>Brazil</b>	<b>U.S.</b>
Diesel Gallons/MMBtu Natural Gas	7.21	7.21
Prime Mover NG Displacement Ratio	80%	80%
Prime Mover Thermal Efficiency Ratio	100%	100%
Genset NG Displacement Ratio	95%	95%
Genset Thermal Efficiency Ratio	100%	100%

# Fuel Cost Savings, Dual-Fuel vs Diesel:

	Brazil	U.S.
Total Diesel Fuel Cost/Vessel/Day	\$5,337	\$6,211
Total Diesel Fuel Cost/Vessel/Year	\$1,870,000	\$2,205,000
Dual-Fuel Cost/Vessel/Day	\$1,800	\$5,400
Dual-Fuel Cost/Vessel/Year	\$628,000	\$1,914,000
Fuel Cost Savings/Year/Vessel	\$1.2 MM	\$0.3 MM
% Savings/Year	66%	14%
Fleet Fuel Cost Savings/Year	\$2.5MM	\$0.3 MM

# Conversion Costs (Estimated):

	<b>Brazil</b>	<b>U.S.</b>
Number of Vessels	2	1
LNG Fuel Tender Barge	0	\$500,000
Engine Conversion Cost/Engine	\$50,000	\$200,000
Modification Cost/Vessel	\$20,000	\$100,000
Development/Project Management	\$500,000	\$500,000

# Revenue Generated by Conversion

	<b>Brazil</b>	<b>U. S.</b>
Diesel Fuel Costs/Year	\$3,740,000	\$2,205,000
Natural Gas + Diesel Fuel Costs/Year	\$1,260,000	\$1,914,000
<b>Fuel Cost Savings/Year</b>	<b>\$2,500,000</b>	<b>\$300,000</b>
<b>NPV @ 15% Discount Rate</b>	<b>\$8.7 Million</b>	<b>\$0.06 Million</b>
<b>Internal Rate of Return</b>	<b>(Payback &lt; One Year)</b>	<b>16%</b>

# Gas Transport Module Barge

